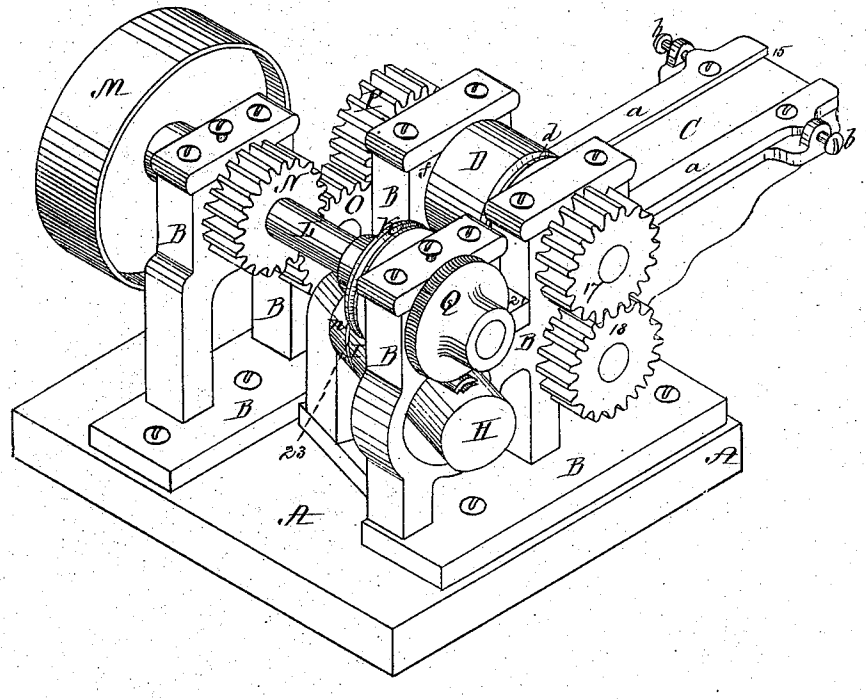
4 Sheets--Sheet 1.

D. A. RITCHIE.

Machines for Making Sheet-Metal Tubes.

No. 128,911. Patented July 9, 1872.

Fig. 1.



Witnesses,
W. J. Cambridge
H. Teschemacher

Inventor,
David A. Ritchie
Per his Attorneys
Teschemacher & Bliss

4 Sheets--Sheet 2.

D. A. RITCHIE.

Machines for Making Sheet-Metal Tubes.

No. 128,911. Patented July 9, 1872.

Fig. 2.

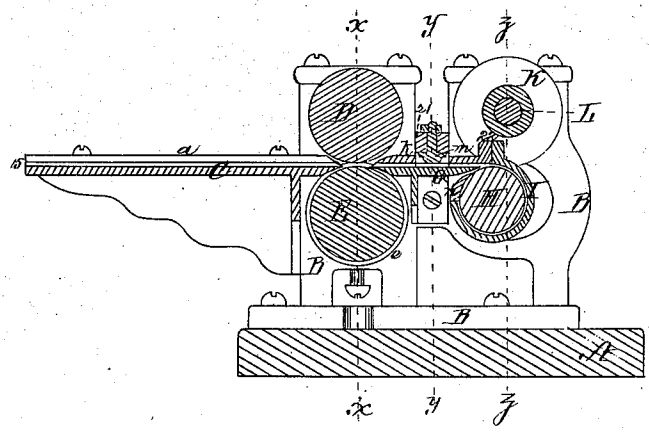


Fig. 3.

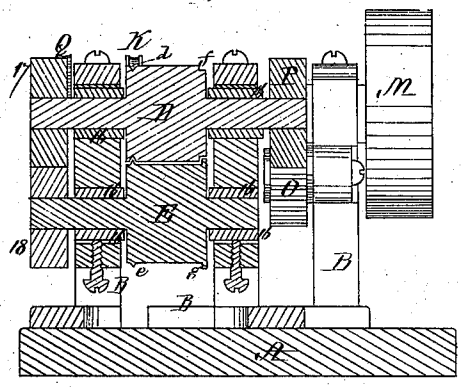
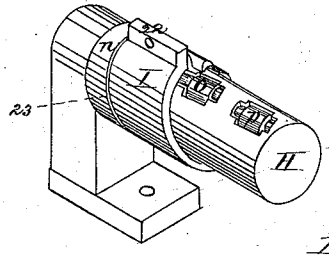


Fig. 4.



Witnesses,
W. J. Cambridge
F. E. Teschemacher

Inventor
David A. Ritchie
Per his Attorneys
Teschemacher & Bleam

4 Sheets--Sheet 3.

D. A. RITCHIE.

Machines for Making Sheet-Metal Tubes.

No. 128,911. Patented July 9, 1872.

Fig. 5.

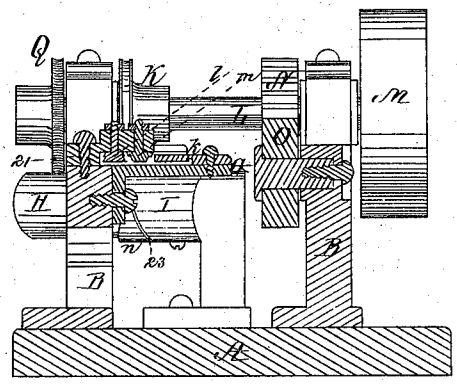


Fig. 6.

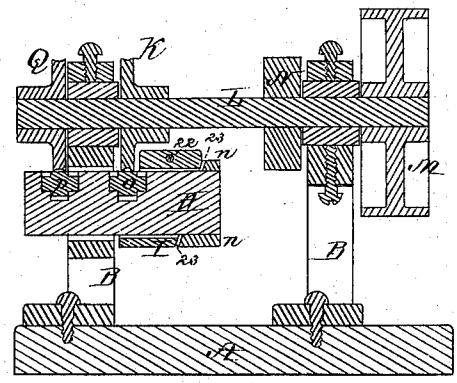
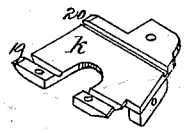


Fig. 7.



Witnesses,
W. J. Cambridge
H. Teschemacher

Inventor,
David A. Ritchie
Per his Attorneys
Teschemacher & Stearns

4 Sheets--Sheet 4.

D. A. RITCHIE.

Machines for Making Sheet-Metal Tubes.

No. 128,911. Patented July 9, 1872.

Fig. 8.

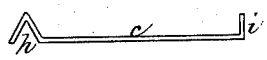


Fig. 9.

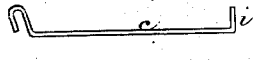


Fig. 10.

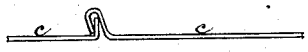
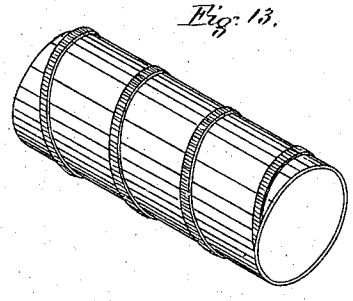


Fig. 11.

Fig. 12.

Fig. 13.



Witnesses,
W. J. Cambridge.
F. Teschemacher

Inventor,
David A. Ritchie
Per his Attorneys
Teschemacher & Stearns

UNITED STATES PATENT OFFICE.

DAVID A. RITCHIE, OF CHARLESTOWN, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR MAKING SHEET-METAL TUBES.

Specification forming part of Letters Patent No. 128,911, dated July 9, 1872.

To all whom it may concern:

Be it known that I, DAVID A. RITCHIE, of Charlestown, in the county of Middlesex and State of Massachusetts, have invented a Machine for Making Sheet-Metal Tubes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of my machine for making sheet-metal tubes. Fig. 2 is a longitudinal vertical section through the same. Fig. 3 is a transverse vertical section on the line *x x* of Fig. 2. Fig. 4 is a perspective view of the stationary mandrel and parts connected therewith. Fig. 5 is a section on the line *y y* of Fig. 2. Fig. 6 is a section on the line *z z* of Fig. 2. Fig. 7, detail to be referred to. Figs. 8, 9, 10, 11, 12, and 13 represent the strip of sheet metal in its successive stages while being formed into a tube or pipe.

My invention consists in a machine for making pipe or tubing by winding a strip of sheet metal spirally around a mandrel, suitable devices being employed for turning and uniting the edges of the strip so as to form a grooved or flanged seam or joint—a pipe so made forming the subject of Letters Patent of the United States granted to me on the 27th day of February, 1872.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawing, A represents the bed of the machine, from which rises the frame-work B, to the sides of the front of which is secured a long table, C, provided with longitudinal pieces *a*, which are made adjustable to and from each other by screws *b*, and serve as guides, between which a strip, *c*, of sheet metal (of the required width to form the pipe) is fed to the rolls D E, the edges of the strip being confined in grooves 15, formed between the table and inner portions of the guides *a*. The shafts of these rolls revolve in boxes 16 sliding vertically in the frame-work, and are connected together, so as to revolve at the same speed, by gear 17 18. One end of the upper roll D is provided with an annular V-shaped groove, *d*, and the corresponding end of the lower roll E is provided with a similar V-shaped projection, *e*, while the opposite end of the upper roll D is turned down to form a continuous square shoulder, *f*, and the corresponding end of the lower roll E is provided with a square flange, *g*, by which construction one edge of the strip *c* of sheet metal is turned up and provided with an inverted V-shaped groove or channel, *h*, and the other edge of the strip turned up to form a flange or tongue, *i*. (See Fig. 8.) In this shape the strip *c* is fed from the rolls D E over an auxiliary table, G, and between it and a covering-plate, *k*, secured thereto, the under side of the strip resting on the auxiliary table, and the turned edges *h i* of the strip passing through grooves 19 20, of corresponding form, in the under side of the plate *k*. After passing through the groove 19 a distance equal to nearly half the length of the table, the inverted V-shaped edge *h* passes between a pair of rolls, *l m*, projecting into a recess in the covering-plate *k*, each roll being of the form of a frustum of a cone, and one being inverted, the two rolls being separated a short distance from each other, and the space between them being directly in line with the groove 19 in the covering-plate *k*, by which means the V-shaped edge is inclined outward, as seen in Fig. 9. The vertical shafts of the rolls *l m* revolve in an arm, 21, secured to the frame-work. As the strip *c* is fed forward by the rolls D E beyond the edge of the covering-plate *k* it passes between a stationary horizontal mandrel, H, (whose axis is inclined to that of the shafts of the rolls D E,) and a spiral sleeve, I, thereon, which is secured to the plate *k* at 22, and serves as a guide, which, in connection with a spiral projection, *n*, on the mandrel H, insures the strip being wound spirally around it, a space, 23, being left between the guide I and projection *n* for the passage of the turned edge *i* of the strip *c*. After making one turn spirally around the mandrel, the flange *i* is brought up underneath and directly in line with the inverted V-shaped groove *h* at a point immediately in front of the point of contact of a grooved wheel, K, with a friction-roll, *o*, revolving in a recess in the mandrel, the wheel K being secured to the driving-shaft L, which revolves in bearings sliding in the frame-work, and is driven by a belt (not shown) passing over a drum, M, secured thereto. The motion of the driving-shaft L is communicated to the

shaft of the upper roll D by means of gears N O P, as seen in Fig. 1. As the strip continues to be fed forward the raised joint, Fig. 10, formed by the union of the flange *i* and the grooved edge *h*, passes between the wheel K and the roll *o*, and is partially flattened or bent over, as seen in Fig. 11. After taking another spiral turn around the mandrel, the joint is still further flattened and at the same time milled (see Fig. 13) by passing between a grooved milling-wheel, Q, on the shaft L, and a friction-roll, *p*, similar to the roll *o* set in a recess in the mandrel H.

Should the pipe be required to be made of soft metal, the strip *c* will spread and slightly increase in width when subjected to the pressure of the rolls D E, and it is, therefore, necessary to cut the strip of a width slightly less than the distance between the grooves 19 20, and also less than the width of the guide I on the mandrel H; otherwise the strip with its turned edges would not be fed properly through the machine. Where a pipe is to be formed in a machine from a narrow strip of sheet metal the mandrel should not be so much inclined to the axis of the rolls D E as in a machine where a pipe is to be formed from a wider strip.

Claims.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The table C and feed-rolls D E, in combination with the auxiliary table G provided with a grooved covering-plate, *k*, substantially as and for the purpose described.

2. I also claim the stationary mandrel H, in combination with the spiral sleeve or guide I and the feed-rolls D E, substantially as described, for the purpose set forth.

3. I also claim the rolls *l m* for inclining the grooved edge *h* of the strip *c*, in combination with the auxiliary table G, covering-plate *k*, and feed-rolls D E, substantially as set forth.

4. I also claim the grooved wheel K and grooved milling-wheel, Q, in combination with the friction rolls *o p* set in recesses in the mandrel H, operating substantially in the manner and for the purpose described.

Witness my hand this 10th day of May, A. D. 1872.

DAVID A. RITCHIE.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.